

REMARKS

The Office Action of August 5, 2008 has been received and carefully considered. However, Applicant respectfully disagrees with the Examiner that the present application as claimed is obvious over the cited prior arts. All claims are now present for examination and favorable reconsideration is respectfully requested in view of the following comments.

REJECTIONS UNDER 35 U.S.C. §103:

Claims 1 – 6 and 10 – 13 have been rejected under 35 U.S.C. §103 as allegedly being unpatentable over RU-2193443. Claims 7 – 9 have been rejected under 35 U.S.C. §103 as allegedly being unpatentable over RU-2193443 in view of EP-0247585.

Applicant traverses the rejection and respectfully submits that the embodiments of present-claimed invention are not obvious over the cited prior art references. It is respectfully submitted that there are significant differences between the embodiments of the present invention and the disclosures in RU-2193443 or EP-0247585.

First, Applicant respectfully traverses the Examiner's point of view in what concerns the fact that the claimed invention according to claims 1-6 and 10-13 is obvious relative to patent RU2193443. In the Examiner's opinion, the method according to RU'443 discloses supplying a liquid medium (e.g., **gasoline or kerosene**) by a pump. However, in patent RU'443 cited in opposition, hydrocarbons are removed from the vapor-gas medium exhausted into the atmosphere not by means of feeding gasoline or kerosene to an absorption column, but by means of feeding thereto a hydrocarbon liquid **having other properties than the petroleum product (gasoline or kerosene)** stored in a storage container or filled into a tank.

RU'443 teaches in its claim 1 that "... **a hydrocarbon liquid with saturated vapor pressure lower than saturated vapor pressure of petroleum or a petroleum product** is fed into

the absorption column as an absorbent" (page 24, lines 12-17, claim 1 in RU'443). The Examiner is requested to pay attention to the fact that it is not just a liquid different from the petroleum product, but a liquid with strictly definite properties that is used in patent RU'443 as the hydrocarbon liquid.

To the contrary, Claim 1 of the present invention defines that "... gasoline is used as the petroleum product and hydrocarbon liquid ...". According to Claim 2 of the present invention, "... gasoline is fed to the separator or to the pump input and simultaneously the liquid medium is removed from the separator into the container for storing the petroleum product (gasoline) or into the filling tank". According to Claim 6, "...the hydrocarbon liquid (gasoline) with the hydrocarbons of the gaseous phase (gasoline vapors) dissolved therein is fed from the absorption column into a container for storing the petroleum product (gasoline) or into a tank to be filled therewith".

Thus, in the present invention, the same petroleum product (gasoline) stored in a tank or filled therein is simultaneously the hydrocarbon liquid fed into the absorption column as an absorbent and the liquid medium supplied by the pump to the liquid-gas jet device for compressing the vapor-gas medium with simultaneous absorption of some portion of hydrocarbons therefrom. The same petroleum product (gasoline) is also the source of hydrocarbons for the vapor-gas medium (a mixture of gasoline vapors with air) fed for purifying.

In this case, the process of removing hydrocarbons (gasoline vapors) from the vapor-gas medium comprises two steps. The first step takes place in the process of interacting the vapor-gas medium with the liquid medium (gasoline) supplied to the liquid-gas jet device, and the second step goes on in the absorption column whereto gasoline is fed as the hydrocarbon liquid. In order to attain a high degree of purification, it is necessary to develop such values of pressure in the separator and temperature of gasoline thus used as an absorbent, which are pointed out in the application. In addition, the pressure and temperature are interdependent and cannot be considered separately from

one another.

If kerosene is used as the petroleum product stored in the tank or filled therein, the above-mentioned method of removing hydrocarbons from a vapor-gas medium is implemented based only on kerosene alone (see Claims 10, 11, 12).

Thus, the hydrocarbon liquid fed into the absorption column in RU'443 is not a petroleum product (e.g., gasoline) filled into the tank or stored in the container, as opposed to the claimed invention where the hydrocarbon liquid fed into the absorption column is a petroleum product (gasoline or kerosene). This is an essential distinction of the claimed invention over RU'443.

In RU'443, the vapors of petroleum or petroleum products are recovered from the vapor-gas medium by means of the hydrocarbon liquid, which is prepared in a column 5 (see, Figure). This hydrocarbon liquid, after catching the vapors of petroleum or petroleum products (e.g., gasoline vapors) in an absorption column 25, is returned once again through a separator 1 via a pipeline 6 into the column 5 where it is regenerated by supplying heat thereto with the help of a furnace 16. As a result, the hydrocarbons (e.g., gasoline vapors) absorbed by the liquid fluid in the column 5 evaporate therefrom. The same hydrocarbon liquid thus regenerated forms the basis for the liquid fluid supplied by a pump 2 into a liquid-gas jet device 3. As the hydrocarbon liquid, a petroleum fraction having the boiling limits within the range of 65 to 420°C is fed into the absorption column (see page 7, lines 23-27; page 10, line 1 – page 16, line 21; page 19, line 8 – page 28, line 4; and claim 2 in RU'443).

Applicant does not agree with the Examiner's opinion that RU'443 teaches usability of gasoline as the liquid medium supplied by the pump 2 into the liquid-gas jet device 3 for pumping out a vapor-gas medium (a mixture of gasoline vapors with air) formed when gasoline is stored in a container 23 or filled in a tank 21.

If gasoline is used as the liquid medium in RU'443, like the Examiner supposed it, then the method for removing hydrocarbons (gasoline vapors) from the vapor-gas medium thus described in this patent will become unfeasible since, in this case, it will be necessary to release the adsorbed gasoline vapors from gasoline by supplying heat thereto in the column 5.

The aforesaid arguments hold true also for kerosene when kerosene is used as the liquid fluid and removes kerosene vapors from the vapor-gas medium. From the above, it is clear that the method for removing hydrocarbons from the vapor-gas medium according to RU'443 is completely different from the method proposed in the claimed invention.

Thus, the features mentioned in Claims 1, 2, 6 (in case of gasoline) and in Claims 10, 11, 12 (in case of kerosene) cannot be brought to reality with the help of the technical solution taught by patent RU 2193443, and these features cannot be used in this technical solution. So, for instance, if the features of claim 6 are used in patent RU'443 and the hydrocarbon liquid with the hydrocarbons of the gaseous phase dissolved therein is fed from the absorption column into a container for storing a petroleum product or into a tank to be filled therewith, the method will discontinue to operate, since the regenerated liquid medium will not come from the column 5 into the circulation contour for the liquid medium.

For the case of removing gasoline vapors from the vapor-gas medium, gasoline in RU'443 also cannot be fed to a separator or to a pump input, since this patent teaches to use, as the liquid medium, heavier hydrocarbon liquid which in the process of operation is regenerated in the column 5, and only this liquid provides the required degree of removing hydrocarbons (gasoline vapors) from the vapor-gas medium.

In the Office Action, it is stated that it would have been obvious to one having ordinary skill in the art to cool the liquid medium so as to ensure more efficient absorption of hydrocarbons from the gas mixture. Also, in the Office Action, it is stated that it would have been obvious to one having

ordinary skill in the art “... to have modified the process of the RU reference (RU’443) by operating the separator as claimed because any pressure including the claimed pressures that maintain the light hydrocarbons (e.g., methane and ethane) in their compressed gaseous state and heavier hydrocarbons (e.g., propane, butane and heavy hydrocarbons) in the liquid medium can be used in the process of the RU reference (RU’443)”.

The Applicant respectfully disagrees about these statements because the gasoline or kerosene vapors contain no methane and ethane. Besides, in the claimed invention, the pressure in the separator and the temperature of gasoline fed into the absorption column are interdependent and cannot be considered separately from one another.

In the course of investigations, it has been found out that it would have been most reasonably, from the viewpoint of economics, to cool the hydrocarbon liquid (gasoline or kerosene) down to a temperature within the range of from minus 10°C to minus 50°C and maintain pressure in the separator within the range of from 0.2 MPa to 1.5 MPa. In doing so, such a degree of removing hydrocarbons from a vapor-gas medium, which complies with European or American standards, is achieved with minimum consumption of electric energy for operating the refrigerating machine that cools the hydrocarbon liquid by means of a refrigerator 10 and for driving a pump 1 that supplies the liquid medium into the liquid-gas jet device (see Figs.1-4). In this respect, it is pointed out in the specification of the claimed technical solution that “Compression of the vapor-gas medium in the liquid-gas jet device 2 below a pressure of 0.2 MPa makes it possible to reduce the consumption of electric energy for the operation of the pump 1 feeding the liquid medium to the jet device 2, but in this case the effectiveness of the process of absorption is reduced, which in turn results in an increase of the consumption of energy for cooling the hydrocarbon liquid fed to the absorption column 4”. “... at a temperature of the hydrocarbon liquid below minus 50°C there is a significant increase of the consumption of electric energy by the refrigerating machine, which is not compensated by an increase of the absorption capability of the hydrocarbon liquid. Simultaneously with a reduction of the temperature, the viscosity of the hydrocarbon liquid increases, which results in the necessity to

increase the consumption of energy for pumping it out and for operation of the absorption column". "... At a temperature of the hydrocarbon liquid above minus 10°C, the required effectiveness of absorption of (degree of removing) hydrocarbons from the vapor-gas medium is not achieved" with an increase of pressure in the separator. "Compression of the vapor-gas mixture in the liquid-gas jet device 2 up to the pressure in the separator above the pressure of 1.5 MPa intensifies the process of absorption of hydrocarbons from the vapor-gas medium, but the consumption of electric energy for operation of the liquid-gas jet device 2 significantly increases, and this increase is not covered by the energy saved due to intensification of the process of absorption in the liquid-gas jet device 1 and in the absorption column 4". "It should be noted that the parameters of operation of the liquid-gas jet device 2 and the refrigerator 10 are interrelated. It was established during research that the necessary effectiveness of operation of the installation with minimum consumption of electric energy is achieved in the aforesaid range of parameters".

In the Office Action, it is stated that it would have been obvious to one having average skill in the art that the method taught by RU'443 can be improved owing to the use of the features as mentioned in claims 3, 4 the presently claimed invention is defined by.

However, the Applicant does not know technical solutions using a vertical pipe (claim 3) or a gasdynamic separator (claim 4) in order to improve removing hydrocarbons from the vapor-gas medium formed during petroleum product storage or when filling a tank therewith. The connections of the vertical pipe or the gasdynamic separator with other elements of the system for removing hydrocarbons from the vapor-gas medium are also not known. In the Office Action, the Examiner did not present prior art technical solutions, which could confirm that both the connections pointed out in claims 3, 4 and the results of the claimed invention are already known.

According to the Office Action, claims 7-9 defining the presently claimed invention are obvious relative to RU'443 when combined with EP-0247585. The Applicant agrees with the Examiner's opinion that EP'585 teaches the use of a membrane device in the system for removing

hydrocarbons from the vapor-gas medium. However, EP'585 does not disclose that the gaseous phase after exiting from the absorption column is fed to a membrane device, and hydrocarbon-enriched gas is pumped out from it by means of the main liquid-gas jet device or an additional liquid-gas jet device. Such a technique, according to the claimed invention, enabled to improve the degree of removing hydrocarbons from the gases vented into the environment and reduce the losses of a marketable product – gasoline.

In the claimed invention, as compared against RU'443, it is pointed out that an additional technical effect is achievable thereby – **“to increase the effectiveness of removing** hydrocarbons and other organic compounds of the exhausted into atmosphere a vapor-gas medium”.

In the claimed invention, there is no heat supply, which is necessary in RU'443 for regeneration of the hydrocarbon liquid circulating in a closed-loop circuit – a factor, which improves the human-engineering and economical attractiveness of the presently claimed technical solution.

Applicant would also like to draw once again the Examiner's attention to the fact that, in the claimed invention, gasoline (a petroleum product) is used as the hydrocarbon liquid and as the liquid medium fed to the liquid-gas jet device in order to utilize the gasoline vapors, and kerosene (a petroleum product) is used in order to utilize the kerosene vapors.

That is why claim 14 (which was previously examined) disclosed “the refrigerator, pump input or separator is connected to the gasoline supply line, and the liquid medium output from the separator is connected to the container for storage of gasoline or to the tank to be filled with gasoline”. In the specification where the operation of the claimed installation is described, it is pointed out that, in order to achieve the technical result indicated for the claimed invention, “the parameters of operation of the liquid-gas jet device 2 and the refrigerator 10 are interrelated”. It is exactly this interrelation of the parameters (expressed in the ranges of pressures and temperatures as presented in the application) allows to use efficiently gasoline for absorption of gasoline vapors from

the vapor-gas medium, and kerosene – for absorption of kerosene vapors.

It is necessary to pay attention to the fact that the above-mentioned particularity of the presently claimed methods and installation for removing hydrocarbons has allowed to get rid of such an element that is indispensable for RU'443 as the regeneration installation 4 for evolving absorbed hydrocarbons from a liquid medium (see Fig. in RU'443). This installation 4 is necessary for restoring the properties of absorbent by supplying heat. This installation is not needed for the presently claimed technical solution.

The analysis thus carried out herein above for the technical solutions taught by RU'443 and EP'585 has clearly shown erroneousness of the position that it would have been obvious to one having ordinary skill in the art to use, in the method taught by RU'443, gasoline as a petroleum product and a hydrocarbon liquid, to feed the gasoline to a liquid-gas jet device and compress the vapor-gas medium therein up to a pressure being obvious to one having ordinary skill in the art at an obvious temperature of the gasoline so as to carry out thereby an efficient absorption with a minimum consumption of energy. Both RU'443 and EP'585 would require substantial technological and design alterations without which it would be impossible to use a petroleum product as a hydrocarbon liquid for absorbing the vapors of exactly the same petroleum product from a vapor-gas medium. Such design alterations are unattainable without any supplementary inventive activity. A simple replacement of the hydrocarbon liquid in RU'443 and, hence, of the liquid medium coming into the liquid-gas jet device, by a petroleum product (for instance, gasoline) will lead to inoperability of thus technical solution.

Only the technological parameters described in claim 1 and claim 10 as well as the design particularities described in claim 14 (which was previously examined), if combined altogether on the basis of the knowledge residing only in the presently claimed invention, will allow to solve the problem the present invention is aimed at.

In summary, it is respectfully submitted that there is no motivation to modify or combine RU-

2193443 or EP-0247585. Even if they are modified or combined, they will not render the present claimed invention obvious and such combination will not disclose all the limitations as defined in the present invention. Thus, one of ordinary skill in the art would not discern the present invention as claimed at the time of its invention.

Therefore, the rejection under 35 U.S.C. §103 has been overcome. Accordingly, withdrawal of the rejections under 35 U.S.C. §103 is respectfully requested.

ELECTION OF RESTRICTION REQUIREMENT

The Examiner has against alleged that the present application contains claims directed to more than one invention and required the Applicant to elect a single invention between Group I, Claims 1 – 13, drawn to a method for removing hydrocarbon from a vapor-gas; and Group II, Claim 14, drawn to an apparatus system.

As previous response of June 23, 2008, Applicant elects the invention of Group I, Claims 1 – 13, drawn to a method for removing hydrocarbon from a vapor-gas, for further examination with traverse. The reasons for the traverse remain the same as those stated in the response of June 23, 2008.

Having overcome all outstanding grounds of rejection, the application is now in condition for allowance, and prompt action toward that end is respectfully solicited.

Respectfully submitted,

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